Microlabs for Pharmacologists

General objective

- Final aim is that effective and safe medicines should be prescribed in a rational way.

Specific objectives

- To make teaching material available for training students in basic principles of experimental and clinical pharmacology.
- To provide information and postgraduate training to physicians for rational drug prescribing.
- To provide tools for good experimental design
- To offer new ways for assessing clinical pharmacological knowledge

Why new teaching technologies?

- New era is characterized by continuing expansion of knowledge and skills
- Education should benefit from the new knowledge and recognize the need for lifelong learning
- But also, public policy considerations focus on the cost of education and government budget priorities offset these positive changes

Changes in teaching style

- **degree for life >>> life long learning**
- **lectures + pracs >>> multiple learning resources**
- **spoon fed >>> independent learners**
- **pen and paper >>> IT based**
- **student takes responsibility**

What's available in innovative teaching, is it better?

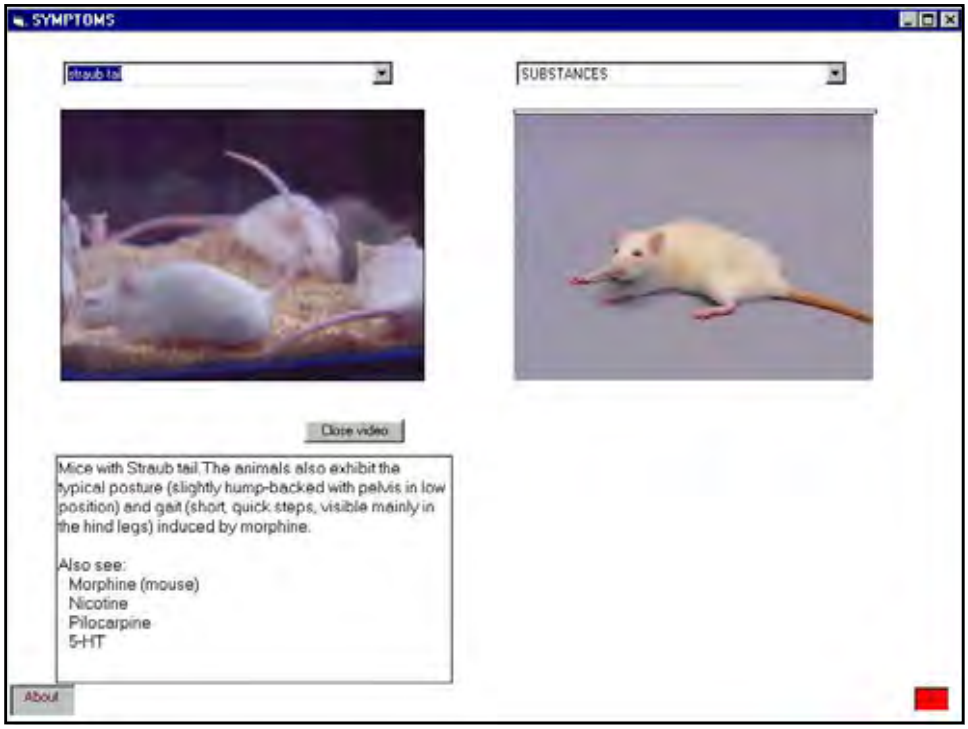
- Peer teaching/peer assessment
- Group working
- Problem based learning
- Electronic learning environments and computer based learning
- Simulations
- Web based teaching resources

Types of Computer Based Teaching Material

- Tutorials
- Simulations
- Databases
- (Video) presentations
- Case studies

What are the Targets Groups?

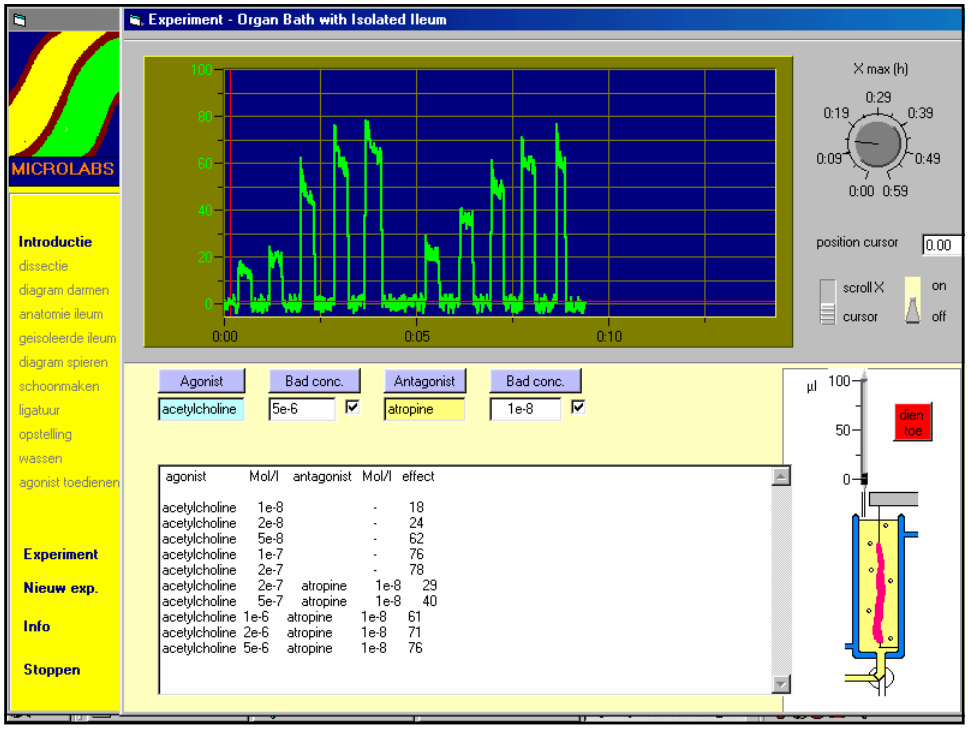
- Undergraduate students in Medicine, Pharmacy and Science
- Clinicians, other health workers and pharmacists
- Young scientists (PhD students)

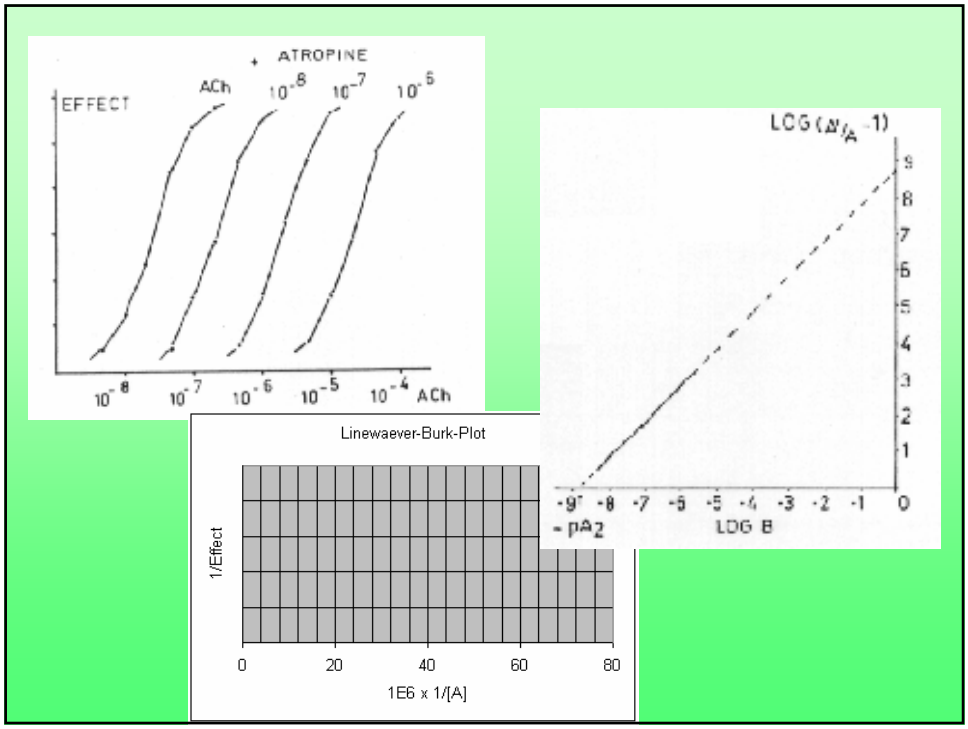

SYMPTOMS
straub tail
SUBSTANCES
Close video
Mice with Straub tail.The animals also exhibit the typical posture (slightly hump-backed with pelvis in low position) and gait (short, quick steps, visible mainly in the hind legs) induced by morphine.
Also see:
Morphine (mouse)
Nicotine
Pilocarpine
5-HT
About


Still
Walk
Rear
Groom
Stretch
Scratch
Urinate
Defecate
Lick
More...
Pause
Main Menu
Help

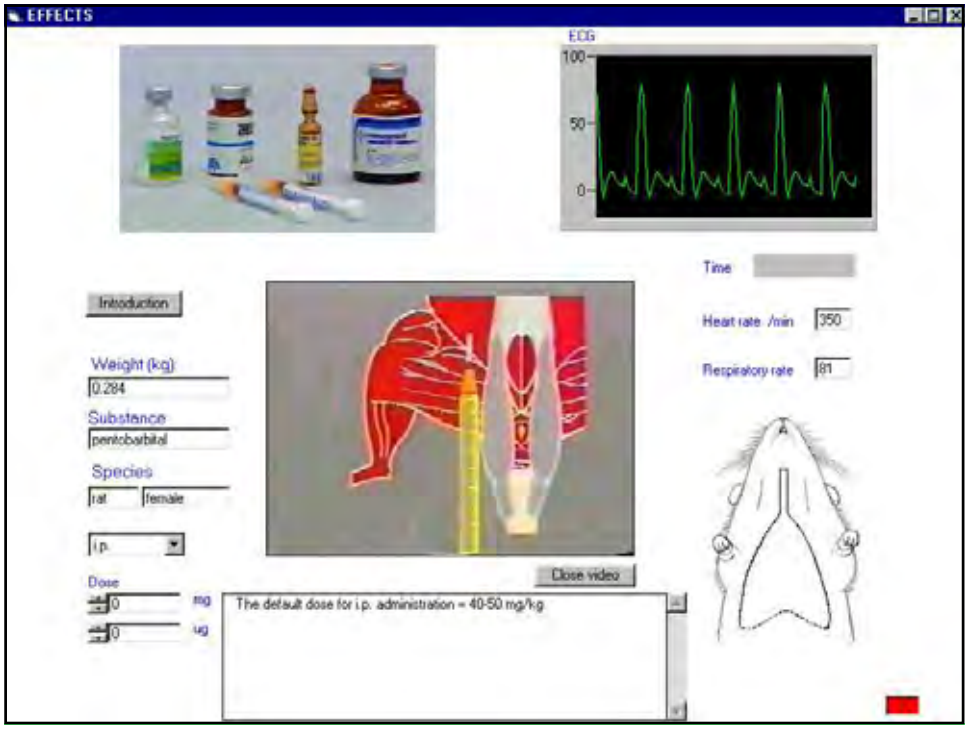

Main Menu
MICROLABS
Introduction
Animal behaviour
Experimental Design
Sample Power
Probit analysis
Anesthesia rat
Isolated ileum
Drug Discovery
About
Quit

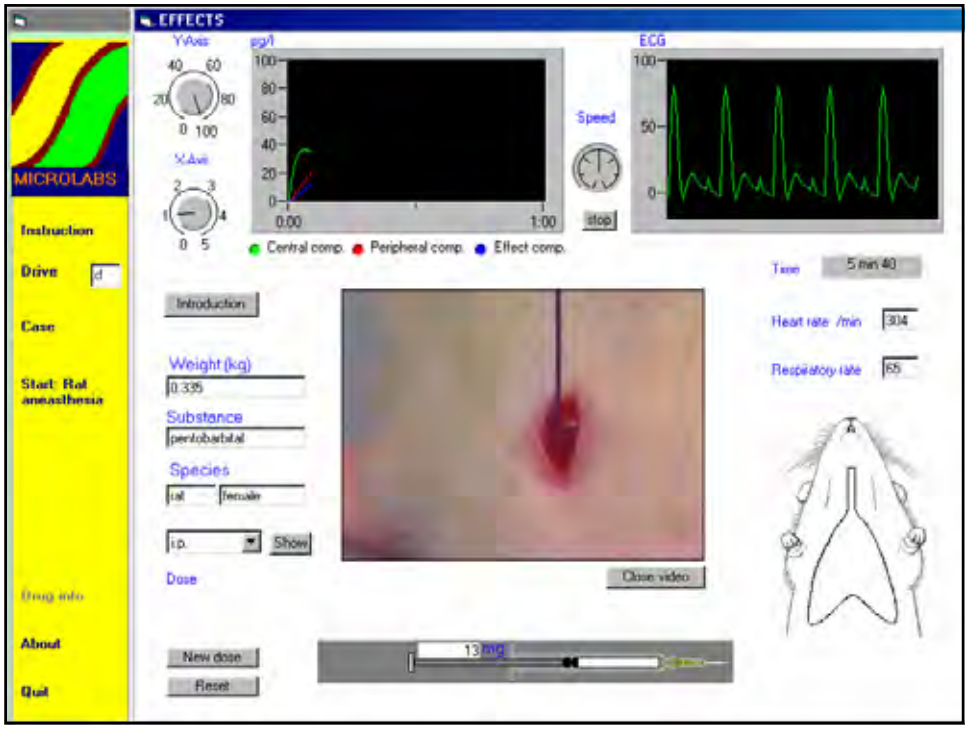

SMOOTH MUSCLE PREPARATION - THE ISOLATED ILEUM
MICROLABS
Introduction
dissection
diagram intestine
anatomy intestine
isolated ileum
diagram muscles
cleaning
ligature
organ bath
washing
drug application
Experiment
Info
Quit
Close
As equipment vaies between institutions, no one type will be specifically refered to. It is essential to aerate the tissue as soon as possible and this must be regularly checked. The air bubbles should be in a steady stream and small enough not to distub the tissue.
The mounted preparation must now be washed several times to provide the tissue with fresh solution. The preparation is then left for the equilibration period of approximately twenty to thirty minutes.


Experiment - Organ Bath with Isolated Ileum
MICROLABS
Introductie
dissectie
diagram darmen
anatomie ileum
geisoleerde ileum
diagram spieren
schoonmaken
ligatuur
opstelling
wassen
agonist toedienen
Experiment
Nieuw exp.
Info
Stoppen
X max (h)
0:29
0:19
0:39
0:09
0:49
0:00 0:59
position cursor
0.00
scroll X
cursor
on
off
Agonist
Bad conc.
Antagonist
Bad conc.
acetylcholine
5e-6
atropine
1e-8
µl
100
50
0
dien toe
agonist Mol/l antagonist Mol/l effect
acetylcholine 1e-8 - 18
acetylcholine 2e-8 - 24
acetylcholine 5e-8 - 62
acetylcholine 1e-7 - 76
acetylcholine 2e-7 - 78
acetylcholine 2e-7 atropine 1e-8 29
acetylcholine 5e-7 atropine 1e-8 40
acetylcholine 1e-6 atropine 1e-8 61
acetylcholine 2e-6 atropine 1e-8 71
acetylcholine 5e-6 atropine 1e-8 76


+ ATROPINE
EFFECT
ACh
10^{-8} 10^{-7} 10^{-5}
10^{-8} 10^{-7} 10^{-6} 10^{-5} 10^{-4} ACh
LOG (A'/A -1)
-pA2
LOG B
Linewaever-Burk-Plot
1/Effect
0 20 40 60 80
1E6 x 1/[A]


Main Menu
MICROLABS
Introduction
Animal behaviour
Experimental Design
Sample Power
Anesthesia rat
Isolated ileum
Case studies
Drug Discovery
About
Quit

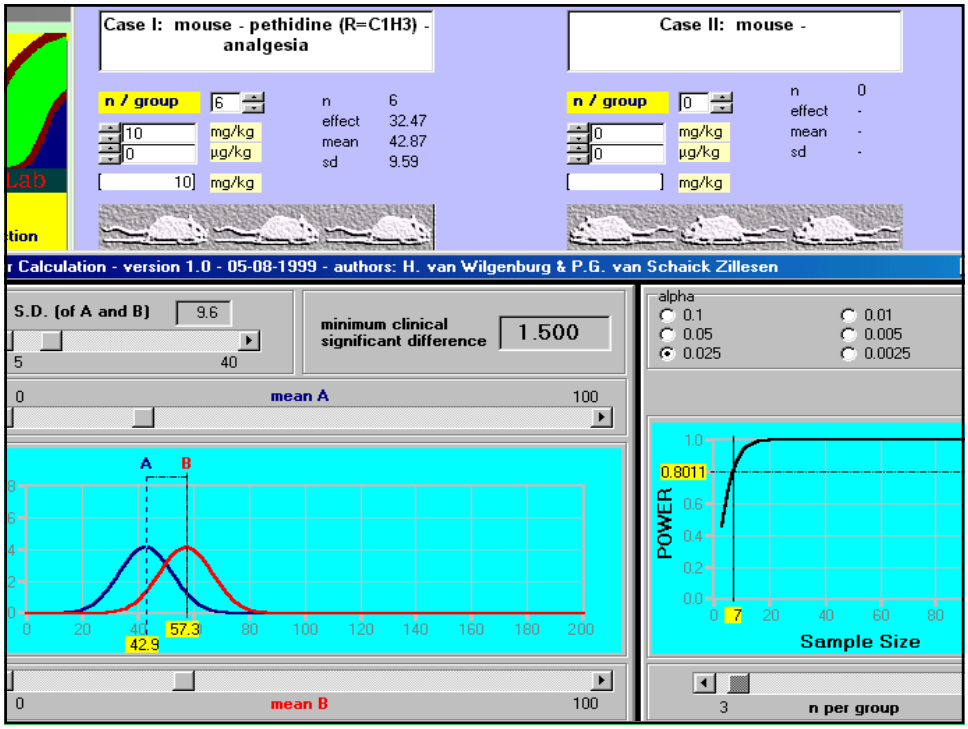

EFFECTS
ECG
100
50
0
Time
Introduction
Heart rate /min
350
Weight (kg)
0.284
Respiratory rate
81
Substance
pentobarbital
Species
rat
female
i.p.
Close video
Dose
mg
ug
The default dose for i.p. administration = 40-50 mg/kg


EFFECTS
MICROLABS
Instruction
Drive
Case
Start Rat anesthesia
About
Quit
YAxis
XAxis
pg/l
ECG
Speed
stop
Central comp.
Peripheral comp.
Effect comp.
Introduction
Weight (kg)
0.335
Substance
pentobarbital
Species
rat
female
i.p.
Show
Dose
New dose
Reset
Close video
Time
5 min 40
Heart rate /min
304
Respiratory rate
65
13 mg


Main Menu
MICROLABS
Introduction
Experimental Design
Probit analysis
Anesthesia rat
Pharmaco - kinetics
Isolated ileum
Case studies
Drug Discovery
About
Quit


Experimental Design
Computer Simulation for improving the Precision of animal experiments
Henk van Wilgenburg
Iva Krulichova
Piet van Schaick Zillesen


EXPERIMENTAL DESIGN
Help
Video's Hot plate
Video's Hot plate
Introduction
NaCl
Morphine
Phenylbutazone
Close
HOT PLATE
The hot plate consists of an heated surface on top of a water bath. The temperature is controlled for 56° to 57°C. The animals are placed on the hotplate and the time, until either licking or jumping occurs, is recorded by a stopwatch. The latency is recorded before and after 20, 30 or 60 minutes following oral or subcutaneous administration of the standard or the test compound.
HOT PLATE METHOD, PURPOSE AND RATIONALE
Return
Introducti
Drug info
Pilot
Case I
Case II
Sample power
About
Quit
Video
Close


Case I: mouse - pethidine (R=C1H3) - analgesia
Case II: mouse -
n / group
6
10
mg/kg
0
µg/kg
n 6
effect 32.47
mean 42.87
sd 9.59
Calculation - version 1.0 - 05-08-1999 - authors: H. van Wilgenburg & P.G. van Schaick Zillesen
S.D. (of A and B)
9.6
minimum clinical significant difference
1.500
alpha
0.1
0.05
0.025
0.01
0.005
0.0025
mean A
mean B
A
B
42.9
57.3
POWER
0.8011
Sample Size
n per group


Main Menu
MICROLABS
Introduction
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Probit analysis
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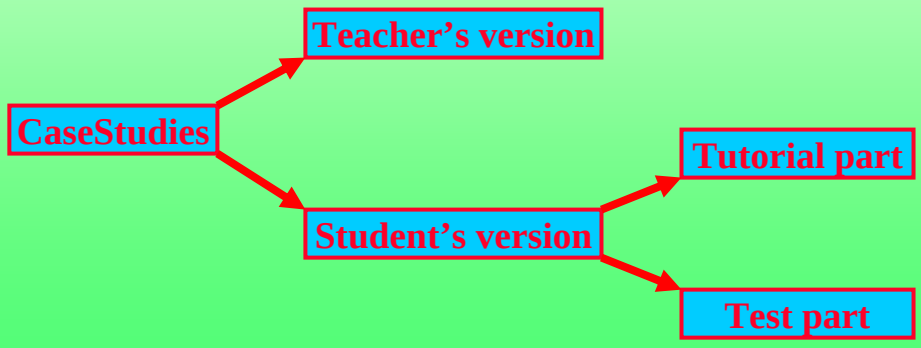
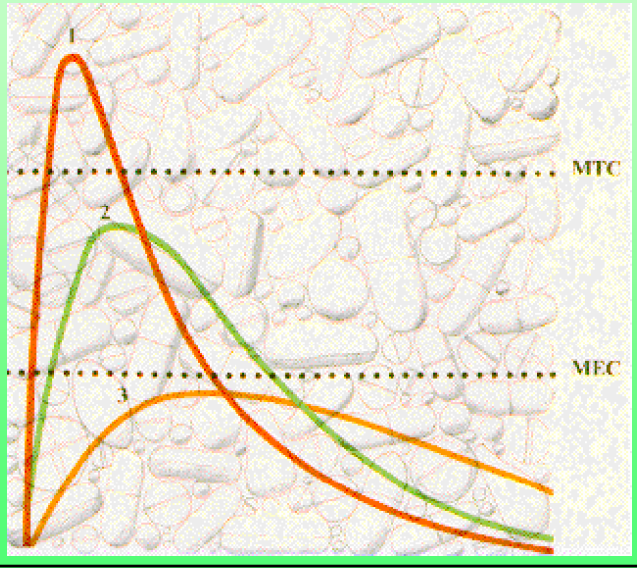
Case studies
About
Quit

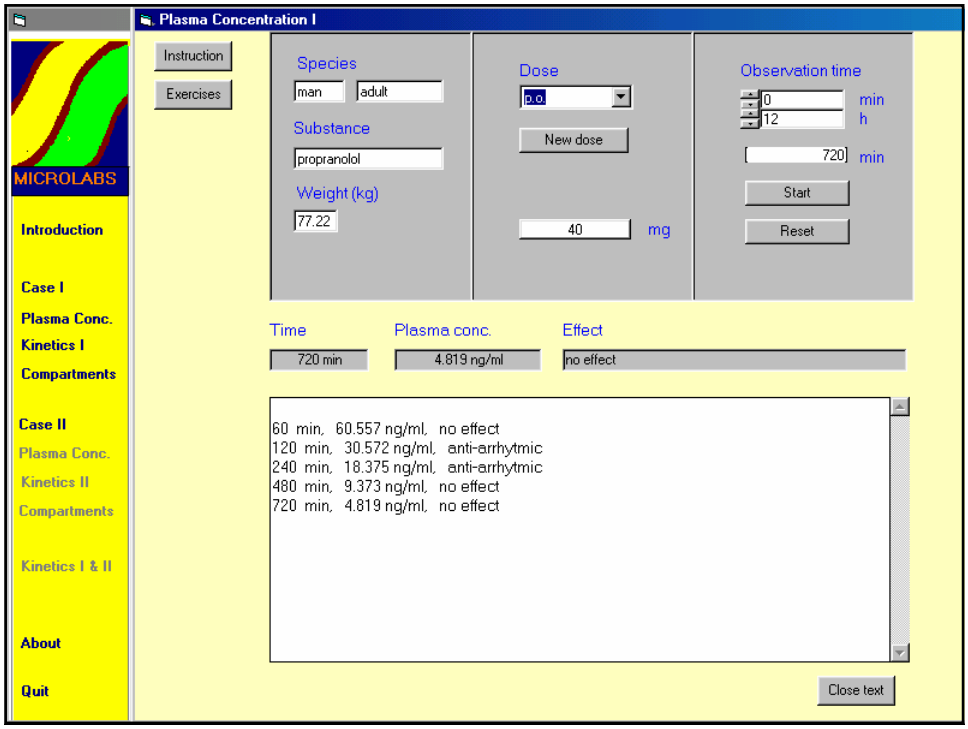
Features of CaseStudies

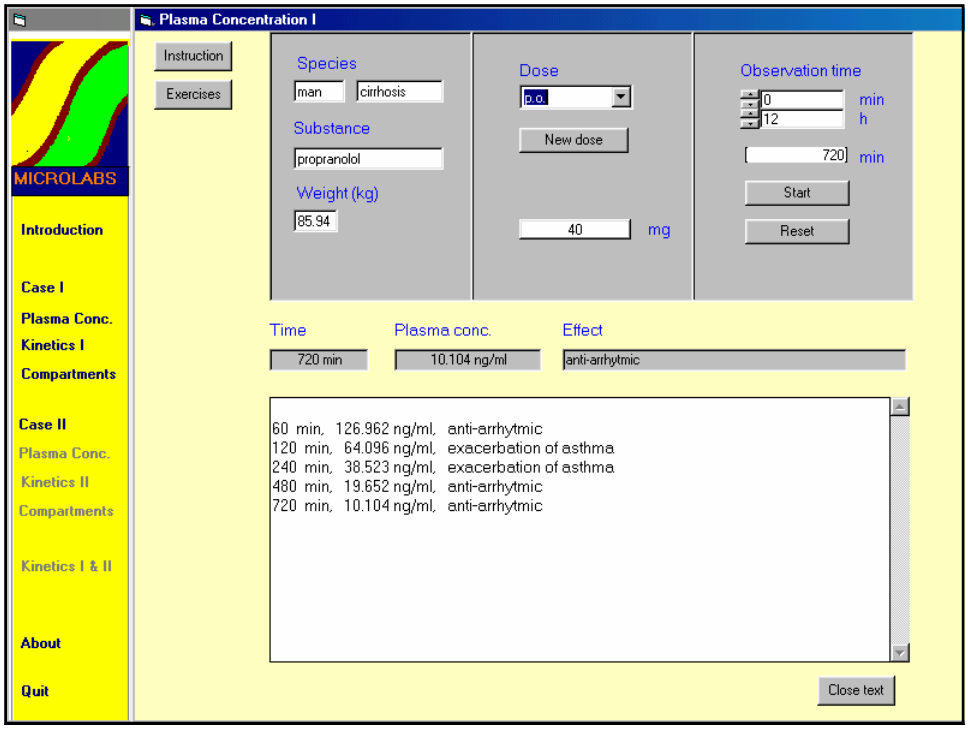
- **CaseStudies** is a general model – database application, into which it is possible to record a case in any language without any other demand on programming.

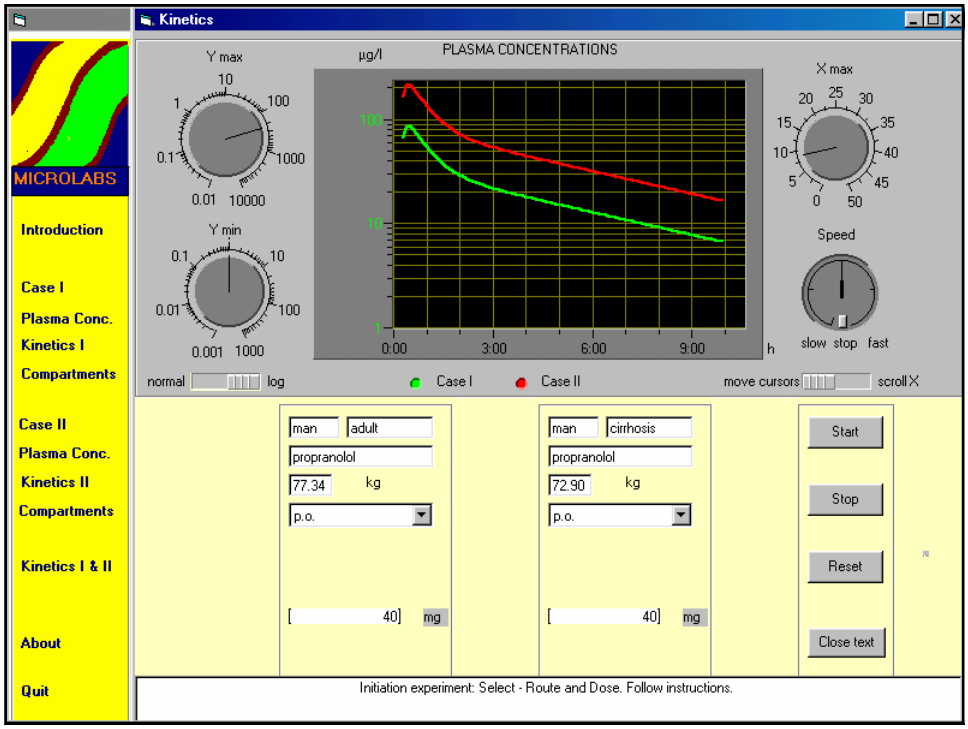


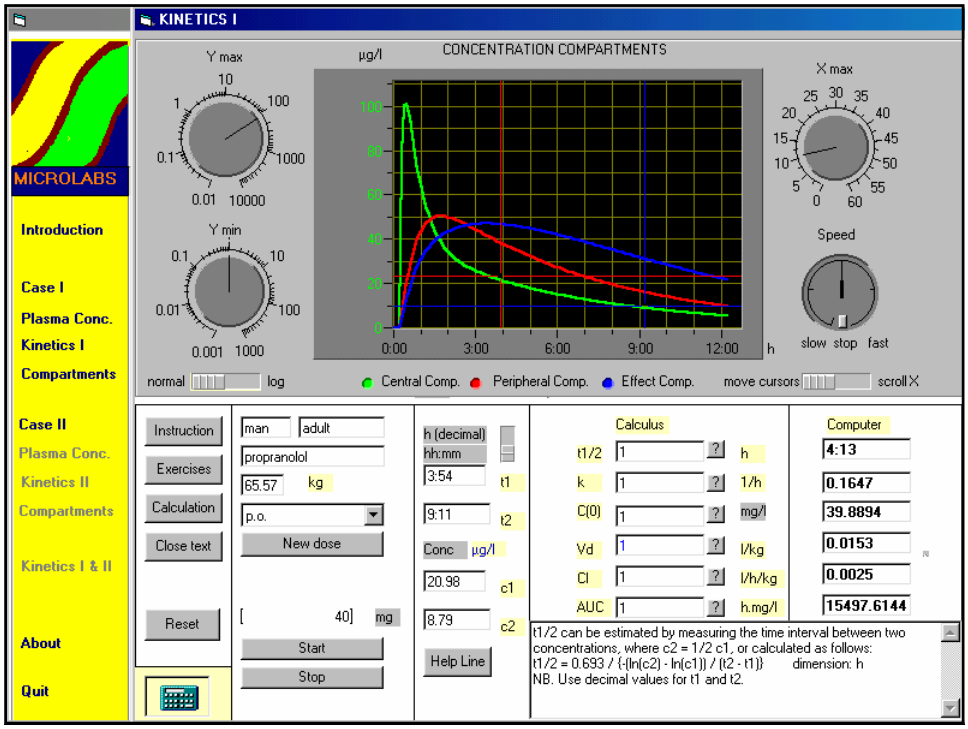
Pharmaco-Kinetics / Dynamics Simulation of the case

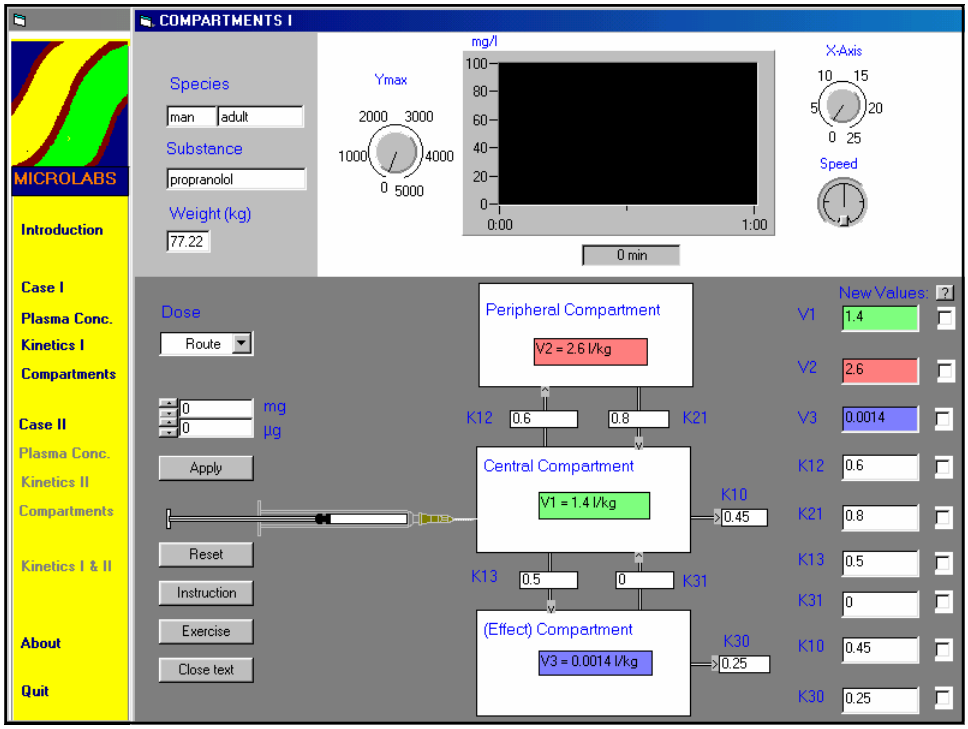



Plasma Concentration I
Instruction
Exercises
MICROLABS
Introduction
Case I
Plasma Conc.
Kinetics I
Compartments
Case II
Plasma Conc.
Kinetics II
Compartments
Kinetics I & II
About
Quit
Species
man
adult
Substance
propranolol
Weight (kg)
77.22
Dose
p.o.
New dose
40
mg
Observation time
0
12
min
h
720
min
Start
Reset
Time
Plasma conc.
Effect
720 min
4.819 ng/ml
no effect
60 min, 60.557 ng/ml, no effect
120 min, 30.572 ng/ml, anti-arrhytmic
240 min, 18.375 ng/ml, anti-arrhytmic
480 min, 9.373 ng/ml, no effect
720 min, 4.819 ng/ml, no effect
Close text


Plasma Concentration I
Instruction
Exercises
MICROLABS
Introduction
Case I
Plasma Conc.
Kinetics I
Compartments
Case II
Plasma Conc.
Kinetics II
Compartments
Kinetics I & II
About
Quit
Species
man
cirrhosis
Substance
propranolol
Weight (kg)
85.94
Dose
p.o.
New dose
40
mg
Observation time
0
12
min
h
720
min
Start
Reset
Time
Plasma conc.
Effect
720 min
10.104 ng/ml
anti-arrhytmic
60 min, 126.962 ng/ml, anti-arrhytmic
120 min, 64.096 ng/ml, exacerbation of asthma
240 min, 38.523 ng/ml, exacerbation of asthma
480 min, 19.652 ng/ml, anti-arrhytmic
720 min, 10.104 ng/ml, anti-arrhytmic
Close text


Kinetics
MICROLABS
Introduction
Case I
Plasma Conc.
Kinetics I
Compartments
Case II
Plasma Conc.
Kinetics II
Compartments
Kinetics I & II
About
Quit
Y max
Y min
µg/l
PLASMA CONCENTRATIONS
X max
Speed
slow stop fast
h
normal log
Case I
Case II
move cursors scroll X
man adult
propranolol
77.34 kg
p.o.
[40] mg
man cirrhosis
propranolol
72.90 kg
p.o.
[40] mg
Start
Stop
Reset
Close text
Initiation experiment: Select - Route and Dose. Follow instructions.


KINETICS I
MICROLABS
Introduction
Case I
Plasma Conc.
Kinetics I
Compartments
Case II
Plasma Conc.
Kinetics II
Compartments
Kinetics I & II
About
Quit
Y max
Y min
µg/l
CONCENTRATION COMPARTMENTS
X max
Speed
slow stop fast
h
normal log
Central Comp.
Peripheral Comp.
Effect Comp.
move cursors scroll X
Instruction
Exercises
Calculation
Close text
Reset
man adult
propranolol
65.57 kg
p.o.
New dose
[40] mg
Start
Stop
h (decimal)
hh:mm
3:54 t1
9:11 t2
Conc µg/l
20.98 c1
8.79 c2
Help Line
Calculus
t1/2 1 ? h
k 1 ? 1/h
C(0) 1 ? mg/l
Vd 1 ? l/kg
Cl 1 ? l/h/kg
AUC 1 ? h.mg/l
Computer
4:13
0.1647
39.8894
0.0153
0.0025
15497.6144
t1/2 can be estimated by measuring the time interval between two concentrations, where c2 = 1/2 c1, or calculated as follows:
t1/2 = 0.693 / (-(ln(c2) - ln(c1)) / (t2 - t1)) dimension: h
NB. Use decimal values for t1 and t2.


COMPARTMENTS I
MICROLABS
Introduction
Case I
Plasma Conc.
Kinetics I
Compartments
Case II
Plasma Conc.
Kinetics II
Compartments
Kinetics I & II
About
Quit
Species
man
adult
Substance
propranolol
Weight (kg)
77.22
Ymax
2000
3000
1000
4000
0
5000
mg/l
100
80
60
40
20
0
0:00
1:00
0 min
X-Axis
10
15
5
20
0
25
Speed
Dose
Route
mg
µg
Apply
Reset
Instruction
Exercise
Close text
Peripheral Compartment
V2 = 2.6 l/kg
K12
0.6
0.8
K21
Central Compartment
V1 = 1.4 l/kg
K10
0.45
K13
0.5
0
K31
(Effect) Compartment
V3 = 0.0014 l/kg
K30
0.25
New Values:
V1
1.4
V2
2.6
V3
0.0014
K12
0.6
K21
0.8
K13
0.5
K31
0
K10
0.45
K30
0.25


Sub Menu - Drug Discovery
MICROLABS
Instructions
Herbal
Plants and Medicine
In vitro studies
In vivo studies
Pharmaco gnosy
Good Agriculture Practice
Back to Main Menu
GLYCER. PHENAZON 6%
SYR. VIOLAE
SYR RHAMN
GLYCER. ACID. TANN. B.P.
OL. MORRH. B.P.
OL. RAP. B.P.C.
LEONARDO DA VINCI
PhytoPhar: European thematic network for PhytoPharmacy training
Leonardo da Vinci project NL/96/2/0055/PI/II.1.1.c./FPC
Dr. Henk van Wijgenburg, co-ordinator
Dept. of Pharmacology University of Amsterdam

Thank you

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